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Does Globalization Hurt the Poor?

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Abstract

Agénor attempts to examine analytically and empirically the extent to which globalization affects the poor in low- and middle-income countries. He begins with a description of various channels through which trade openness and financial integration may have an adverse effect on poverty. However, the author also stresses the possible nonlinearities involved—possibilities that have seldom been recognized in the ongoing debate. Agénor then presents cross-country regressions that relate measures of real and financial integration to poverty. The regressions control for changes in income per capita and output growth rates, as well as various other macroeconomic and structural variables, such as the inflation tax, changes in the real exchange rate and the terms of trade, health and schooling indicators, and macroeconomic volatility. The author uses not only individual indicators of trade and financial openness but also a "globalization index" based on principal components analysis, and tests for both linear and nonlinear effects.

The results suggest the existence of a nonmonotonic, Laffer-type relationship between globalization and poverty. At low levels, globalization appears to hurt the poor; but beyond a certain threshold, it seems to reduce poverty—possibly because it brings with it renewed impetus for reform. So, globalization may hurt the poor not because it went too far, but rather because it did not go far enough.

This paper—a product of the Poverty Reduction and Economic Management Division, World Bank Institute—is part of a larger effort in the institute to study the impact of globalization on the poor in developing countries. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Maria Gosiengfiao, room J4-282, telephone 202-473-3363, fax 202-676-9810, email address mgosiengfiao@worldbank.org. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The author may be contacted at pagenor@worldbank.org. October 2002. (56 pages)

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Does Globalization Hurt the Poor?

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Table of Contents

I. Introduction

II. How Globalization *may* hurt the Poor

1. Trade Openness

2. Financial Integration

3. Nonlinearities

III. Methodology

III. Preliminary Empirical Evidence

IV. A Poverty-Globalization Laffer Curve?

V. Concluding Remarks

Appendix A: Country Names, Variable Definitions and Data Sources

Appendix B: Calculation of Principal Components

References

Tables 1 to 5

Figure 1. The Poverty-Globalization Laffer Curve

I. INTRODUCTION

Globalization–defined as the process through which goods and services, capital, people, information and ideas flow across borders and lead to greater integration of economies and societies–has made substantial advances in recent decades and is viewed by many as an inescapable feature of the world today. There are, undoubtedly, significant potential benefits to globalization. For instance, it is now well recognized that openness to foreign direct investment can contribute to growth by stimulating domestic investment, improving efficiency and productivity (as a result of greater access to new technologies), or by increasing the "knowledge" applied to production. Openness to capital flows may also increase opportunities for portfolio risk diversification and consumption smoothing through borrowing and lending; and producers who are able to diversify risks on world capital markets may invest in more risky (and higher-yield) projects, thereby raising the country's rate of economic growth (Obstfeld (1994)). Increased access to the domestic financial system by foreign banks may raise the efficiency of the intermediation process between savers and borrowers, thereby lowering markup rates in banking, as well as the cost of investment, and raising growth rates (Baldwin and Forslid (2000)). More directly, to the extent that financial openness helps to mitigate asymmetric information problems and to reduce the fixed costs associated with small-scale lending, it can improve the opportunities for the poor to access the formal financial system.[1]

Similarly, openness to trade may generate significant gains, both static and dynamic. Static economic gains, as emphasized by conventional trade theory,

[1]As discussed by Eichengreen (2001), however, although there is evidence suggesting that financial openness and financial development may raise growth–as in Bekaert, Harvey and Lundblad (2002), Bosworth and Collins (2000), Jalilian and Kirkpatrick (2002), and Levine (2000)–there is some debate as to the exact magnitude of these effects. Klein and Olivei (2001), for instance, analyzed the effects of capital account liberalization on growth and financial depth for a cross-section of countries over the period 1986-95. They found that countries with open capital accounts experienced a larger increase in financial depth than countries with closed capital accounts, and through that channel, higher rates of economic growth. However, this positive effect

refer to the fact that under greater openness to trade, productive resources tend to be reallocated toward activities where they are used with comparatively greater efficiency and away from less efficient activities (such as import-substitution industries or rent-seeking activities). In addition, the literature on endogenous growth has emphasized the existence of various mechanisms through which trade openness may generate dynamic gains and thereby affect the economy's rate of growth in the long run. In particular, it has been argued that trade openness may facilitate the acquisition of new inputs, less expensive or higher-quality intermediate goods, and improved technologies, which enhance the overall productivity of the economy. Romer (1994), for instance, has argued that in an economy subject to trade restrictions, only a narrow range of specialized intermediate goods or capital goods can be profitably produced and therefore the full range of technological possibilities, which rely on a potentially broader range of inputs, cannot be exploited effectively. In this model a greater variety of inputs does more for production than a greater quantity of a narrow range of inputs. Thus, access to a variety of foreign inputs at a lower cost shifts the economy-wide production possibility frontier outward, thereby raising productivity.[2] Moreover, the mechanism through which increased productivity and growth rates occur as economies become open to international trade is not limited to the adoption of more specialized intermediate inputs and machinery available from trading partners; there are many types of useful knowledge that are not embodied in material inputs (such as production engineering and information about changing product patterns), but can also be transferred as a result of trade with more advanced countries. As argued by Romer (1992), in practice, the transmission of

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appears to be significant only for industrial countries, not for developing countries. Carkovic and Levine (2002) also failed to find a robust, independent effect of FDI on growth.

[2] Several other contributions have emphasized the role of the international diffusion and adoption of new technologies or new goods. Grossman and Helpman (1991) and Rivera-Batiz and Romer (1991), for instance, developed models in which technology is produced by profit-maximizing firms. They showed that openness to international markets can increase the growth rate of technology by increasing the size of the market available to technology producers and allowing those countries with a comparative advantage in technology production to specialize in that activity. International trade may also improve domestic productivity and economic growth by increasing knowledge spillovers from more advanced trading partners. Baldwin and Forslid (2000)

ideas may be as important, if not more important, than the transmission of new inputs.

There is indeed some empirical evidence suggesting that trade integration has beneficial effects on the level and growth rate of output. Studies by Frankel and Romer (1999) and Irwin and Tervio (2002) have shown that countries that are more open to trade have higher incomes. In line with more recent theories of trade and growth, Klenow and Rodriguez-clare (1997) used a computable general equilibrium framework that accounts for product variety effects through a production function in which a lower number of intermediate input varieties results in productivity losses and lower output, despite the same capital and labor inputs. They found that accounting for such effects can quadruple the static gains from unilateral trade liberalization. Coe, Helpman, and Hoffmaister (1997) found that trade flows provide a conduit through which advanced production techniques and technological knowledge are transmitted across countries.[3] Wacziarg (1998) found that investment is the most important channel through which openness raises growth, accounting for more than 60 percent of the total effect. Moreover, the empirical evidence also suggests that the learning-by-doing and growth effects of these spillovers are largest in countries with higher levels of education. Finally, a recent study by the World Bank (2002) suggests that the countries that have opened themselves the most to trade in the last two decades (the "new globalizers") have, on average, grown the fastest. These countries managed to reduce import tariffs, on average, by 34 percentage points since 1980, compared with only 11 percentage points for those developing countries that, on average, saw no growth in per capita incomes over the period. Because trade is good for growth, and growth is allegedly good for the poor (on average, increased growth raises the incomes of the poor in proportion to those of the population as claimed by Dollar and Kraay (2001)) the study concludes that trade (or, more generally,

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extend the Grossman-Helpman framework to account for imperfect competition and scale economies in the research and development sector.

international economic integration) is good for the poor. Nevertheless, as for financial integration, there is significant controversy as to the exact magnitude (if not direction) of the benefits associated with trade liberalization. In a detailed review of some the existing empirical studies, for instance, Rodriguez and Rodrik (1999) suggest a cautious assessment of their robustness.

Moreover, it is now increasingly recognized that the process of globalization entails significant risks and potentially large economic and social costly. Openness to global capital markets has brought greater volatility in domestic financial markets, particularly in countries whose financial systems were weak to begin with and economic policies lacked credibility. Large reversals in short-term capital flows (induced by the volatility of world capital markets) have led to severe financial crises and sharp increases in unemployment and poverty in the short run. Similarly, trade liberalization has led in some countries to reduced demand for unskilled labor and lower real wages in the short run; combined with a low degree of inter-sectoral labor mobility, job losses and income declines have often translated into higher poverty rates.[4] As a result, there have been growing concerns about the negative effects of globalization, and an increasingly polarized debate on the plight of the world's poorest--namely, whether many of the 1.2 billion people who still live on less than $1 a day are sharing in the benefits of greater integration among economies and instead are disproportionately hit by short-run crises and economic downturns.

The main purpose of this paper is to try to assess, using cross-country econometric techniques, the extent to which globalization may indeed hurt the poor. Cross-country regressions--most notably in the context of empirical growth economics--have been the subject of criticism for their *ad hoc* specification and the fragility of many of the results that they lead to (see Temple (1999)). They are,

[3] As mentioned earlier, foreign direct investment provides another, perhaps more direct, route through which technology and advanced managerial and production techniques can flow from industrial to developing countries.

nevertheless, useful tools with significant advantages over "event" or "case" studies. Such studies generally suffer from sample selectivity bias and are unable to isolate with any degree of precision the independent effect of a particular variable or set of variables (that is, in the present context, the impact of globalization on poverty, as opposed to domestic factors). Although the econometric methodology used in this paper does not allow one to take a firm stand regarding issues such as causality, it provides a useful first step (subject to the caveats discussed below) in an attempt to disentangle the effects of globalization *per se* on poverty, while at the same time controlling for a number of other determinants.

The paper is organized as follows. Section II identifies various mechanisms, related to both trade openness and financial integration, through which globalization *may* hurt the poor. This review is by no means exhaustive; my objective here is mainly to show that although there are very good analytical arguments to suggest that globalization may benefit the poor (as discussed earlier), there are equally plausible ones that support the view that trade or financial integration may have an adverse effect on poverty. By implication, determining whether globalization is (on net) "good" or "bad" for the poor is--as is often the case in economics--an empirical issue, not a matter of faith. This is by no means a claim to novelty but rather a reminder of a point that has often been "lost" by partisan views on both sides of the debate. I also emphasize the fact that the relationship between trade and financial openness and poverty may be non-monotonic. This is also important, not only because the possibility of a nonlinear relationship has seldom been recognized in the debate, but also because it has implications for empirical tests.[5] Section III discusses the basic specification of the

[4]Imperfect labor mobility across sectors seems indeed to have characterized several recent episodes of trade reform in developing countries (see Seddon and Wacziarg (2001)).

[5] Edwards (2001) did point out the possibility that capital account openness may be beneficial only once a certain level of development is reached. Similarly, Bekaert, Harvey and Lundblad (2002) found that the impact of financial liberalization on growth depends on the country's level of secondary school enrollment. However, Arteta, Eichengreen and Wyplosz (2001) found that Edwards' results were not robust; and Bekaert, Harvey and Lundblad focused only on stock market liberalization.

regression model (including the choice of control variables) and explains the two dimensions through which globalization is measured. By necessity, my operational definition of "globalization" is narrower than what the concept usually involves (as defined earlier); I focus on measures of trade and financial openness (which indirectly captures technology transfers), but I do not capture the potentially important effects of labor and information flows. Section IV discusses some basic (linear) regression results. Section V extends the analysis to construct a "globalization index" based on principal components analysis. This index is then used to perform both linear and nonlinear regressions--using in the latter case the squared value of the index. I also discuss some robustness tests associated with these regressions. Section VI offers some concluding remarks and stresses the need for further empirical testing.

I. HOW GLOBALIZATION *MAY* HURT THE POOR

It is actually not very difficult to think of a number of channels through which the process of globalization may hurt the poor. Some of the most ardent "pro-globalization" advocates would admit that, for instance, trade reform in developing countries may lead in the short run to higher unemployment and greater poverty, as a result of pervasive labor market distortions—such as a low degree of wage flexibility and imperfect labor mobility across sectors. In this section I want to emphasize, without trying to be exhaustive, the possibility that globalization may affect poverty adversely *in the long run* as well. I first describe some possible channels through which trade liberalization may increase poverty, and then proceed to do the same for financial integration. I conclude this brief overview by stressing the importance of understanding the possible discontinuities and other nonlinearities that may arise in trying to assess the direction and strength of the link between globalization and poverty. Throughout the discussion, I will stress not only the possible direct effects of globalization on the poor, but also the indirect

effects that may operate through the rate of economic growth--a fairly well-documented empirical regularity.

1. Trade Openness

Although, as noted in the introduction, there are some good arguments suggesting that trade liberalization may improve resource allocation in the short term or raise growth rates permanently (and thus be beneficial to the poor), there are a number of other arguments suggesting the opposite.[6] Opening a country's markets to foreign firms, for instance, tends to reduce the market power of domestic firms and increase competitive pressures on them, eventually forcing (some of) them out of business. In the longer run, the country may well become more efficient in using its productive resources, thereby enjoying higher growth rates and lower poverty. But in the short term, the inability to compete, and the presence of labor market rigidities (segmentation due to minimum wage legislation or wage-setting behavior by firms or trade unions, as well as imperfect mobility across sectors), may hamper the reallocation of labor between nontradables and tradables that a reduction in tariffs normally entails (see, for instance, Agénor and Aizenman (1996)). As a result, both unemployment and poverty may increase and persist over time.

Similarly, the effects of scale economies and learning-by-doing emphasized in the new theories of trade and growth take place mostly in the production of advanced manufactured products, such as high-technology goods. However, if a country is "lagging behind" technologically and has an initial comparative advantage in "non-dynamic" sectors, openness to trade can reduce the growth rate (Matsuyama (1992)). Indeed, exports of many developing countries continue to consist of raw materials (including energy and agricultural products) and relatively low-technology manufactured goods (such as textiles). Even though

[6]See Winters (2002) for a detailed discussion of the linkages between trade policies and the poverty.

openness to trade (and capital flows) may help these countries to assimilate technologies and production techniques over time (thereby enabling them to shift eventually toward the production of goods and services that are characterized by dynamic gains) there may again be a "transition period" during which globalization may have only a limited effect (if at all) on growth and poverty. It has also been argued that opening an economy to trade may discourage domestic research and development activities, for instance by inducing the poorer countries to allocate too much of their limited supply of skilled labor to the production of manufactured goods. In such conditions, paradoxically, restrictions on trade may accelerate growth.

Trade liberalization may also lead to higher poverty by reducing the demand for unskilled labor and worsening income distribution. In a number of countries (particularly in Latin America), openness to trade during the 1980s and 1990s has coincided with an increase in the demand of, and the return to, skilled labor relative to unskilled labor, and a worsening of income distribution. An explanation of this phenomenon is that trade liberalization has been associated with the introduction of higher-level technology, the use of which requires skilled labor. The reason is that the cost of (imported) capital depends not only on the relative price of capital goods but also on tariffs that are incurred in purchasing a unit of capital goods abroad. To the extent that a fall in tariffs translates into a fall in the cost of capital (as the evidence suggests), a high degree of complementarity between skilled labor and capital, and a high degree of substitutability between unskilled labor and capital, would indeed entail an increase in the demand for skilled labor--thereby leading to a widening of the wage gap between skilled and unskilled labor.[7] The reduction in the demand for unskilled labor may translate into higher unemployment for that category of labor and increased poverty. Moreover, in the presence of imperfect credit markets (and following the logic of Galor and Zeira (1993)), the worsening of income distribution may hamper the ability of unskilled

workers to pledge collateral and borrow to finance the acquisition of skills, thereby making an escape from the "poverty trap" more difficult. There is strong empirical evidence suggesting that, indeed, human capital accumulation in developing countries is subject to credit market imperfections.

The link between trade openness and the accumulation of human capital is important to understand the long-run effects of globalization on poverty. Do open trade regimes lead to high investment in human capital in developing countries? Some theoretical models actually predict that free trade may lead to a *decrease* in the accumulation of human capital in countries that are initially skills-scarce. Findlay and Kierzkowski (1983), for instance, using a model in which capital markets are perfect, showed that the accumulation of human capital (and thus the supply of skilled labor) in countries that are initially skills-scarce falls when the rewards to education are reduced by the availability of cheaper, skills-intensive import goods. By contrast, Cartiglia (1997) showed that trade may actually *reduce* initial differences in supplies of human capital. A key element of his analysis is the assumption that credit constraints (as mentioned earlier) limit the ability of unskilled workers to finance the education needed to become skilled. In such conditions, capital market imperfections affect the pattern of comparative advantage and the impact of trade liberalization. Because the argument is, I think, quite relevant for assessing the link between globalization and poverty in developing countries, it is worth reviewing it in some detail.[8]

To begin with, consider a two-sector small open economy in which all workers (skilled and unskilled) live two periods. Two tradable goods are produced: a "high-tech" good and a "low-tech" good (denoted by the subscripts H and L, respectively). Production of the H good, Y_H, requires both capital and

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[7]For instance, Beyer, Rojas, and Vergara (1999) found that trade openness, as measured by the volume of trade over GDP, widened the wage gap between skilled and unskilled labor in Chile.

[8]Galor and Zeira (1996) present an alternative framework in which trade liberalization, by increasing the relative price of goods produced by skilled workers, affects the return to human capital.

skilled labor (in quantities K_H and S_H, respectively), whereas production of the *L* good, Y_L, requires capital and unskilled labor (in quantities K_L and U, respectively). Assuming the same Cobb-Douglas technology in both sectors, production is given by

$$Y_H = K_H^{\alpha} S_H^{1-\alpha}, \quad 0 < \alpha < 1, \tag{1}$$

$$Y_L = K_L^{\alpha} U^{1-\alpha}, \tag{2}$$

with the (constant) total stock of capital given by

$$K = K_H + K_L. \tag{3}$$

Let *z* denote the relative price of the *H*-good in terms of the *L*-good; because both goods are tradable, *z* is given on world markets. Assuming perfect mobility of capital across sectors and perfect competition, the rates of return on capital in each sector (that is, the marginal product of capital) must be equal:

$$\alpha K_L^{\alpha-1} U^{1-\alpha} = z\alpha K_L^{\alpha-1} S_H^{1-\alpha} = r. \tag{4}$$

Using (3) and (4), the equilibrium value of K_H is thus

$$K_H = \frac{K/U}{1/U + z^{1/(\alpha-1)}/S_H}.$$

Wages of skilled and unskilled workers, w_S and w_U respectively, are determined from (1) and (2) by the marginal productivity of labor. Using the resulting expressions and (4), it can be established that

$$\frac{w_S}{r} = \frac{1-\alpha}{\alpha}\left[\frac{S_H}{K} + z^{-1/(1-\alpha)}\frac{U}{K}\right]^{-1}. \tag{5}$$

Thus, for z and the composition of the labor force (S_H and U) given, the composition of production and factor returns are uniquely determined.

As noted above, each Individual lives two periods. In the first period, the individual can either go to school or work as an unskilled worker. Individuals who go to school in the first period of their life work as skilled labor in the second period; the others remain unskilled. At the end of the second period, all individuals die and have one child. There is no population growth, and the size of each generation is normalized to one. At every point in time, one young generation and one old generation are alive, so that the total size of the population is 2. In what follows, let $e_t \in (0,1)$ denote the proportion of (unskilled) individuals born in period t who go to school in period t.

Within each generation, individuals differ in the ownership of capital. Specifically, the distribution of capital within each generation is assumed to be constant over time and distributed uniformly over the interval ($k_m = a + \upsilon + t$, $k_M = b + \upsilon - t$):

$$n(k_s) = n(k_s; a, b, \upsilon, t) = \frac{1}{b-a-2t} I_{k_m, k_M}(k_s),$$

where $t \geq 0$, $\upsilon \geq 0$, $a \geq 0$, $b > a+2t$ and $b > 0$. The richest individuals own $k_M = b + \upsilon - t$ units of capital, whereas the poorest own $k_m = a + \upsilon + t$ units. Thus, of course $k_M - k_m = b - a - 2t$, which is positive given the restriction imposed on b. Let $n(k_s)$ denote the number of individuals who own k_s units of capital.

The number of individuals in each generation is

$$\frac{1}{b-a-2t} \int_{k_m=a+\upsilon+t}^{k_M=b+\upsilon-t} dk_s = 1,$$

whereas the total stock of capital owned by each generation is

$$\frac{1}{b-a-2t}\int_{k_m=a+\upsilon+t}^{k_M=b+\upsilon-t} k_s dk_s = \frac{a+b+2\upsilon}{2},$$

so that

$$K = a + b + 2\upsilon. \tag{6}$$

Thus, because in every period the total size of the population is 2, the size of the aggregate capital stock is $a + b + 2\upsilon$.

The number of individuals in each generation whose stock of capital is at least as large as q is

$$n_q = 1 - \frac{1}{b-a-2t}\int_{k_m=a+\upsilon+t}^{q} dk_s = \frac{k_M-q}{b-a-2t}. \tag{7}$$

A quantity S_E of skilled workers are used to educate those individuals e_t who go to school in each period. Suppose, for simplicity, that the "production" of education is linear:

$$S_{Et} = \gamma e_t. \tag{8}$$

The supply of skilled workers at t is therefore equal to the number of individuals who went to school in the previous period, e_{t-1}, and is allocated between teachers and production of the H-good:

$$S_t = e_{t-1} = S_{Ht} + S_{Et}, \tag{9}$$

which implies that, using (8):

$$S_{Ht} = e_{t-1} - \gamma e_t. \tag{10}$$

The supply of unskilled workers at t is the sum of those who chose not to go to school in the previous period, $1-e_{t-1}$, and those who opted not to go to school in the current period:

$$U_t = 2 - e_{t-1} - e_t. \tag{11}$$

In the steady state, the number of individuals who become educated is the same in every generation ($e_t = e$); thus, equations (8) to (11) imply

$$S_E = \gamma e, \quad S_H = (1-\gamma)e, \quad S = e. \tag{12}$$

$$U = 2(1-e). \tag{13}$$

Suppose that the price of the H-good is high enough to ensure that the wage differential between w_U and w_S is such that all individuals would prefer to be skilled, but that at the same time imperfections of the credit market (again, along the lines of Galor and Zeira (1993)) are such that the ability to invest in human capital in the first period of life depends on inherited wealth. Specifically, suppose that individual i will be able to attend school only if the income that he derives from its own capital, rk_i, is as least as large as the cost of tuition, given by the wage of a (skilled) teacher, w_S, multiplied by the teacher-students ratio, γ. That is,

$$rk_i \geq \gamma w_S.$$

Then, setting $q = \gamma w_S/r$ and $n_q = e$ in (7) yields

$$e = \frac{b+v-t-\gamma(w_S/r)}{b-a-2t}. \tag{14}$$

This equation gives the number of individuals in each generation that will be able to attend school, as a linear function of w_S/r. Inverting it yields

$$\frac{w_S}{r} = \frac{b+v-t}{\gamma} - \frac{(b-a-2t)}{\gamma}e. \tag{15}$$

Substituting the steady-state values of S_H and U from (12) and (13) in (5) and using (6) yields

$$\frac{w_S}{r} = \frac{1-\alpha}{\alpha}\left[\frac{(1-\gamma)e}{a+b+2v} + z^{-1/(1-\alpha)}\frac{2(1-e)}{a+b+2v}\right]^{-1}. \tag{16}$$

Equations (15) and (16) are two steady-state relations between e and w_S/r that determine the long-run general equilibrium of the economy. An interior solution is obtained for $0 < e < 1$; otherwise, the economy either has no skilled labor and is specialized in the production of the L-good, or has only skilled labor and is specialized in the production of the H-good ($e = 1$).

To examine the effect of trade openness in this setting, consider an economy that is initially skills-scarce and whose comparative advantage in autarky (or prior to liberalization) is in the production of the L-good. When the economy is opened, the price of the H-good falls, and thus z falls as well. This, in turn, leads to a reduction in w_S, the return to the factor specific to the H-sector. The (equilibrium) number of individuals who attend school therefore increases. The reason is that when the price of the H-good falls, the wage of skilled workers falls as well, both because of the direct effect of the price change and because capital tends to move toward the L-good sector. Trade openness makes employment in the production of the H-good less profitable and induces skilled workers to switch away from production and into teaching; the fall in the cost of education that the reduction in w_S entails makes credit constraints less binding

and more people can afford education. The supply of skilled labor therefore increases in equilibrium.

The opposite happens in a country whose initial endowment of skilled labor is high and whose comparative advantage, prior to openness, is in the *H*-good. Trade increases the price of the *H*-good and induces skilled workers to switch from teaching toward production of the *H*-good. z rises and trade liberalization is associated with an increase in the demand for skilled labor relative to the demand for unskilled labor; the wage differential between labor categories widens. The cost of education rises and a smaller number of (unskilled) individuals are able to afford it. Put differently, trade liberalization increases the rewards of education in countries that are skills-abundant to begin with, and reduces the reward to education in countries that are skills-scarce initially. Capital market imperfections hinder the accumulation of human capital because the cost of education is a binding constraint. In initially skills-scarce countries, trade liberalization eases financing constraints (because the cost of education falls as w_S falls) and induces an increase in the accumulation of skills.[9]

Thus, in the presence of capital market imperfections that affect the ability of workers to borrow and invest in human capital, the impact of trade liberalization depends crucially on initial conditions, namely, the country's endowment of skilled labor. Suppose that one is considering a country characterized by a comparative advantage in the production of the *L*-good prior to trade liberalization (a fairly reasonable assumption for many low-income countries); does the model imply that poverty would fall as a result of trade openness? If one takes the unskilled wage as a measure of the poverty line and the ratio of unskilled workers to the total number of workers as an approximation to the "headcount" poverty index, the answer is yes. But if the poverty line is exogenous and the behavior of wages in the aftermath of liberalization is taken into account, the answer is ambiguous, for

two reasons. First, although the number of skilled workers rises, their wage falls. Second, as a result of gross complementarity between factors, physical capital used in the production of the *H*-good rises (as can be inferred from (1)) and falls in the *L*-sector; thus, although the fall in the supply of unskilled workers tends to put upward pressure on wages for that category of labor, the fall in the capital stock in the *L*-sector exerts an opposite effect, because of its impact on the marginal productivity of labor in that sector (as can be inferred from (2)); thus, whether w_U goes up or down cannot be established *a priori*.[10] As a result, one cannot say for sure whether poverty rises or falls--it all depends on where the poverty line stands with respect to the initial and post-liberalization levels of the unskilled wage. The point, nevertheless, is that poverty *may* increase, as a result of the interplay between trade openness, the incentives that changes in factor returns create to accumulate human capital, and the borrowing constraints that individuals may face on the credit market when seeking to finance the acquisition of skills.

2. Financial Integration

As noted earlier, although international financial market integration may bring significant benefits in the long term (and there is indeed some evidence suggesting that this is the case), it is increasingly recognized that a high degree of financial openness may entail significant short-term costs as well. The magnitude of the capital flows recorded by some developing countries in recent years and the abrupt reversals that such flows have displayed at times have been associated with deep financial instability, economic crises and sharp increases in poverty rates--particularly in countries with imprudent sovereign debt management, improperly sequenced capital account liberalization, and poorly

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[9]Kim and Kim (2000) argued that education (or what they called "general" human capital) may also help to increase the degree of *mobility* of workers across sectors, thereby attenuating the costs of trade reform (including a short-run increase in poverty) and raising growth rates.

[10]Moreover, note that the fact that the supply of skilled labor increases in the model is entirely due to the assumption that the cost of education is proportional to w_U; if one assumes that tuition costs are exogenous, then the credit constraint would not change, possibly leading to no change in the equilibrium number of skilled workers.

regulated domestic financial systems. The recent crisis in East Asia is a case in point (see, for instance, Horton and Mazumdar (2001)).

A key problem associated with financial openness is that access to world capital markets tends to be *asymmetric*. Many developing countries (including some of the richer ones) are able to borrow on world capital markets only in "good" times, whereas in "bad" times they tend to face credit constraints. Access is thus pro-cyclical. Clearly, in such conditions, one of the alleged benefits of accessing world capital markets (the ability to borrow to smooth consumption in the face of temporary adverse shocks), is nothing but a fiction. Pro-cyclicality may, in fact, have a perverse effect and increase macroeconomic instability (see, for instance, Agénor (2001) and Dadush, Dasgupta, and Ratha (2000)): favorable shocks may attract large capital inflows and encourage consumption and spending at levels that are unsustainable in the longer term, forcing countries to over-adjust to adverse shocks as a result of abrupt capital reversals. The impact on poverty may thus be magnified.

In recent years, financial globalization in many transition and developing economies has taken the form of greater penetration of the domestic financial system by foreign banks. Unlike trade liberalization, which has often resulted from unilateral decisions by governments to lower tariffs, this form of financial integration has often been less a matter of choice than a decision imposed by the country's situation--in several cases, the need to recapitalize domestic banks in the aftermath of a banking crisis (see Agénor (2001)). Although there are potentially large benefits associated with greater foreign penetration (such as enhanced quality of financial services, better techniques for credit analysis, and reduced risks of domestic financial instability), which may translate into higher growth rates and lower poverty, there are potentially adverse effects as well. Most importantly for the issue at stake, to the extent that foreign penetration is accompanied by a greater concentration of credit flows toward large firms producing tradables, and reduced access to loans by small and medium-size firms

(which tend to be more labor intensive than larger ones), it may lead to reduced levels of economic activity, lower demand for labor, and possibly to a greater incidence of poverty. Evidence on this issue is still rather tenuous, but the possibility cannot be dismissed.

Another channel through which financial openness may have an adverse effect on the poor (at least in the short run) is the credit market. As argued by Agénor and Aizenman (1998, 1999)--in a framework that emphasizes the links between capital flows, the financial system, and the supply side of the economy, as well as the costly state verification approach pioneered by Townsend (1979)--the increased exposure to volatile shocks that is associated with financial openness may translate into higher domestic interest rates (because of the increased risk of default), lower domestic output, and thus possibly higher poverty rates. The key reason is that increased volatility (of world interest rates, in particular) raises expected intermediation costs and lead domestic financial institutions (whose ability to enforce loan contracts is limited) to either increase domestic interest rates or to ration credit to maintain expected profits. Of course, what this argument implies is that financial integration should be accompanied by adequate reforms of the domestic financial system to minimize the adverse effects of volatility on output, employment, and poverty--not that financial openness per se is undesirable.

But in addition to level effects associated with greater exposure to volatility, it has been argued that financial openness may also have adverse effects on growth and, through that channel, on poverty. In particular, Devereux and Smith (1994) studied the effects of international risk sharing (portfolio diversification) in a multi-country world in which growth is based upon the spillover effects of human capital accumulation. They showed that when countries share endowment risk via international capital markets, the saving and growth rates can be lower than in autarky. How they arrive at this conclusion is worth examining in more detail.

Consider a world consisting of N countries, each of them with a stationary population. All countries produce a single homogeneous good, and there is an infinitely-lived, representative agent with constant relative risk aversion (CRRA) preferences, given by

$$E_0 \sum_{t=0}^{\infty} \beta^t \left\{ \frac{c_{it}^{1-\sigma}}{1-\sigma} \right\}, \quad i = 1,2,\ldots N.$$

Production technology is also identical across countries. Specifically, output y_{it} is given by

$$y_{it} = \theta k_{it}^{\alpha} (H_{it} x_{it})^{1-\alpha},$$

where k_{it} is the firm's capital stock (and also country i's investment at t, assuming full depreciation within a period), H_{it} the stock of knowledge (or human capital), and x_{it} hours (supplied inelastically). In equilibrium, $H_{it} = K_{it}$ (the economy-wide capital stock), so that there are aggregate constant returns to scale in capital alone.

Each country faces idiosyncratic income risk but there is no aggregate uncertainty at the world level. More formally, there is a country-specific, random income shock, ε_{it}, which is assumed to be proportional to the economy-wide capital stock in each country:

$$\varepsilon_{it} = \gamma_{it} K_{it},$$

where the distribution of the γ_{it} is assumed to be such that each country faces a zero-mean, i.i.d. process for its income risk over time and the aggregate world shock is zero in a symmetric equilibrium $\sum_{i=1}^{N} \gamma_{it} = 0$

Agents choose consumption, investment, and asset holdings to maximize lifetime utility. Under "financial autarky", there are no markets that allow for international diversification of country-specific risk, and thus no trade in (state-contingent) assets between countries. Domestic saving must therefore be equal to domestic investment. Devereux and Smith show that the growth rate in this case, g_{it}^{A} , is a random variable and is given by

$$g_{it}^{A} = \phi(\theta + \gamma_{it}), \qquad \phi \equiv [\beta\alpha\theta E_t(\theta + \gamma_{it+1})^{-\sigma}]^{1/\sigma}, \tag{17}$$

where ϕ can be shown to be a time-invariant function of the distribution of γ. This expression shows that, because of the assumption of CRRA preferences (which implies positive third-order derivatives), an increase in country-specific income risk (as measured by a mean-preserving spread in the distribution of γ_i) will increase the economy's (average) growth rate through its positive impact on savings (which equals investment under autarky).

By contrast, under "financial openness", there are complete international markets for risk sharing; with no aggregate uncertainty, this completeness allows agents in each country to fully diversify country-specific risk. Devereux and Smith show that the growth rate in this case is non-stochastic and given by

$$g_{it}^{O} = \eta\theta, \qquad \eta \equiv (\beta\alpha\theta^{1-\sigma})^{1/\sigma}. \tag{18}$$

The expression in (18) is similar to (17), except that the γ distribution does not appear.[11] By eliminating country-specific income risk, financial market integration eliminates the impact of this risk on savings, and therefore on economic growth. A comparison of (17) and (18) shows indeed that the average growth rate is lower under openness, because the elimination of income risk reduces world savings. Put differently, equilibrium growth rates in all countries are

11Note that to ensure positive growth requires imposing $\eta\theta > 1$.

lower under financial openness. The reason is that, as indicated above, with CRRA preferences riskier income leads to greater saving as a result of a precautionary motive. With full risk sharing, income risk is diversified away, reducing the equilibrium savings rate in each country. Lower saving in turn tends to lower the growth rate in each country.[12]

As shown by Devereux and Smith, the above result also holds if, instead of income-specific risk, countries differ in that they face specific productivity disturbances, θ_{it}, provided that the distribution of productivity shocks satisfies again a "no aggregate uncertainty" condition and that $\sigma > 1$ (the most relevant case empirically).[13] However, it is sensitive to the assumption that there is only one investment technology available. As can be inferred from the results of Greenwood and Jovanovich (1990) and Obstfeld (1994), if there are many (risky) technologies available, financial openness may increase the equilibrium growth rate--even if it reduces savings rates, as a result of the precautionary motive alluded to earlier--by leading to a reallocation of savings to projects with high risk and return. Similarly, it should be noted that the above model takes the *depth* of the financial system as given when assessing the impact of financial integration. However, it is possible that the two may be positively related beyond a certain level of income; in Agénor and Aizenman (1999), for instance, financial openness translates into lower interest rate markups and more efficient intermediation by domestic banks. In that case, international financial openness may bring additional benefits, which could mitigate the adverse impact of a greater opportunity for risk diversification on savings and growth. The point, nevertheless,

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12They also show that if the gains from risk sharing under openness are more than offset by the losses associated with a reduced growth rate, welfare of each country may be lower than under financial autarky.

13Note that the assumption of time-separable, CRRA preferences is important for the argument but not crucial: as shown by Weil (1990), with generalized iso-elastic preferences that do not satisfy the axioms of expected utility and in which risk aversion is distinct from (the inverse of) intertemporal substitution, the response of savings to risk would depend in sign only on intertemporal substitution. Thus, in the Devereux-smith model, greater opportunities for risk sharing through international financial integration would therefore lead to lower savings and growth rates if the elasticity of intertemporal substitution is less than one (as is often the case in practice).

is that it is possible for financial globalization to hurt the poor (even in the long run), by lowering growth rates permanently.

2. Nonlinearities

The foregoing discussion focused on the possibility of a linear, negative relationship between increased globalization and poverty. There are also, however, possible discontinuities (or threshold effects) and other nonlinearities that may come into play and alter the sign of the relationship between globalization and poverty. Understanding what causes these nonlinearities (which have seldom been acknowledged in the debate on the benefits and costs of globalization) is important not only from an analytical standpoint but also from the perspective of empirical analysis.

Consider the following example, which is described in more detail in Agénor (2002*b*).[14] Suppose that trade liberalization has two types of effects. The first is an *output effect*, which translates into an increase in income per capita (as a result, for instance, of improved efficiency in the allocation of domestic resources). Suppose also that, in line with the evidence provided by Greenaway, Morgan and Wright (2002), this effect has a J-curve shape: at first, output falls (as output in import-competing industries drops) and then increases gradually (as the exportables sector expands). Assuming for simplicity a one-to-one, inverse relationship between income and poverty, this implies that globalization has an inverted J-curve effect on poverty.

The second effect of trade liberalization is a *relative wage effect*, which is also assumed to be non-monotonic. Specifically, suppose that at first, the skilled-unskilled wage differential increases with openness (as documented by Harrison and Hanson (1999), for instance), possibly because imports of capital goods

increase and firms substitute away from unskilled labor. Employment of that category of labor falls initially and poverty tends to increase. Over time, however, the initial widening in wage differentials may lead to investment in human capital and a gradual increase in the supply of skilled labor; this would tend to narrow the wage differential across skill categories, and higher degrees of liberalization may reduce poverty. This second effect may thus take the form of an inverted U-shape relation--which would depend, for instance, on whether there exists a subsidy to skills acquisition or not.

It is intuitively easy to see that, with both effects being nonlinear, multiple equilibria may emerge. However, for the purpose at hand, what is important to note is that the initial and longer-run effects of trade liberalization on poverty, operating either through output or relative wages, differ in sign: although poverty may rise in the short run, as output increases and investment in education rises, poverty begins to fall. Thus, not only does the sign of the relationship between globalization and poverty vary over time, the absolute value of the elasticity between these two variables is also not constant. Moreover, discontinuities may appear: the initial widening of the wage differential, for instance, may not be sufficiently large to translate into strong incentives to invest in skills; beyond a certain threshold, however, the impact of the wage differential on the propensity to acquire human capital may change in a discrete fashion and may trigger a large increase in the supply of skilled labor. These discontinuities could lead, for instance, to a piece-wise linear relationship between globalization and poverty. Similar arguments can readily be developed to argue in favor of the existence of a nonlinear relationship between financial integration and poverty--as can be inferred, for instance, from the "threshold" effect on the volatility of world interest rates discussed by Agénor and Aizenman (1999) in their analysis of the welfare benefits and costs of financial integration.

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[14] See for instance Albuquerque and Rebelo (2000) for another example of the nonlinear effect of trade reform. Their focus, however, is on changes in the industrial structure, rather than unemployment and poverty.

The thrust of the foregoing discussion is thus twofold. First, although there are solid analytical arguments to suggest that globalization may improve the plight of the poor (in high- and low-income countries alike), there are also equally-convincing reasons (at least to me) to suggest that the poor may not, after all, benefit much from trade and financial integration--at least without significant government interference. Assessing the net effects of globalization on the poor is therefore not a matter of faith, but rather an empirical issue. Second, there are important nonlinearities that may emerge in assessing the link between globalization and poverty. These nonlinearities are not mere theoretical curiosities; on the contrary, it can plausibly be argued that they may be very much at play in the real world. Ignoring them may seriously hamper the reliability of empirical results and may lead to misleading conclusions.

III. METHODOLOGY

To assess the relationship between globalization and poverty I use a cross-country regression framework, using unbalanced panel data for a group of developing countries for which I was able to collect sufficient data. The dependent variable is the poverty rate (*POV*), measured by the headcount index for the population as a whole. In addition to measures of trade and financial integration, I include two sets of "control" variables, based on my previous results (see Agénor (2002*a*)): macroeconomic variables and structural indicators. Specifically, The set of explanatory variables used in the regressions are the following (see Appendix A for more precise definitions):

INFLTAX is the inflation tax rate, defined as the ratio of the inflation rate over one plus the inflation rate. This variable is conveniently bounded between zero and implies a concave relation between poverty and the inflation rate;

TRANSGDP is the ratio of total subsidies and other current transfers over GDP, which aims at capturing the level effects associated with changes in public spending;

LITY is the youth literacy rate in percent of the population aged 15-24, which aims to capture the level of education of the labor force;

LHOSPITAL is the log of hospital beds per 1,000 persons, which measures overall health conditions;

GDPPC is GDP per capita at PPP exchange rates, which captures the level of economic development;

REALGR is the annual growth rate of GDP per capita, measured at PPP exchange rates, which can be viewed as either a proxy for the rate of return on physical investment, or as a measure of cyclical movements in output;

REALEX is the annual rate of change of the real effective exchange rate (defined such that an increase is a depreciation);

CTOT is the percentage change in the terms of trade;

VREALXL is a measure of macroeconomic volatility, which consists of rolling standard deviations of the real exchange rate.

I have discussed at length elsewhere the rationale for considering these variables (see Agénor (2002*a*, 2002*b*)), so only a brief justification is offered here. The inflation tax (which is levied on non-indexed assets, such as currency holdings) is expected to have a positive effect on poverty. Current transfers as a proportion of GDP has a priori an ambiguous effect. The effect of an across-the-board cut in transfers, for instance, may be to raise poverty; but to the extent that

it is accompanied by better targeting, poverty may fall. An increase in the literacy rate and an improvement in health (as measured by an increase in the number of hospital beds), are expected to reduce poverty. Both the level of GDP per capita and its rate of growth are also expected to be negatively correlated with the poverty rate. The effect of a real exchange rate depreciation is in general ambiguous; it may lead to a reduction in poverty if it benefits small farmers in the tradable sector (as is the case in many low-income developing countries), but if at the same time it brings about a significant increase in the cost-of-living index in urban areas, overall poverty may increase. An improvement in the terms of trade tends to reduce poverty if it represents an increase in the relative price of agricultural commodities (thereby benefiting small farmers in rural areas) or a fall in the price of imported consumption goods (benefiting mostly households in urban areas). At the same time, however, a rise in import prices may have an adverse supply-side effect (because it raises the price of imported inputs) and may lower output, employment, and real wages, thereby increasing poverty. Finally, an increase in macroeconomic volatility (as measured by greater volatility of the real exchange rate) is expected to increase poverty, possibly through its adverse effect on investment and the propensity to save.

To measure globalization, even narrowly defined (as is the case in this study) to focus on trade and financial integration, is an arduous task. In particular, it is difficult to find an adequate measure of trade openness--which should ideally measure how open markets are to foreign competition. Proxies for openness that have been used include tariffs, nontariff barriers, effective rates of protection, trade liberalization, relative prices, import penetration, export intensity, and deviations of actual from predicted trade flows or volumes (see Edwards (1998), Harrison (1996), Harrison and Hanson (1999), and Rodriguez and Rodrik (1999)). Here, to measure trade globalization, I use two indicators:

OPEN, the ratio of the sum of imports and exports of goods and services in percent of GDP (referred to in what follows as the "trade openness indicator"), which aims to capture exposure to external shocks;

TARIFF, the average tariff rate (that is, total tariff revenue divided by the value of imports).

The most common approach to examine the impact of financial openness in cross-country studies is to build an index of capital account restrictions on the basis of the qualitative information reported in the IMF's *Annual Report on Exchange Arrangements and Restrictions*.[15] The trouble with this approach is that it provides no clue regarding the *intensity* of capital restrictions--or, inversely, the effective degree of capital account liberalization. Here, I chose a different route and opted for an "effective" measure of financial globalization, the ratio of foreign direct investment flows (FDI) to GDP. [16]

If trade openness lowers poverty, the first variable should have a negative coefficient, whereas the second should have a positive coefficient. Similarly, if financial integration reduces poverty, the FDI-to-GDP ratio should have a negative coefficient in the estimated regression.

It is important to acknowledge at the outset that all three of the above measures of globalization are problematic, because they capture only indirectly the process of trade and financial openness. For instance, the trade openness

[15]For instance, in their study on capital flows to transition economies, Garibaldi et al. (2002) constructed indices of restrictions on foreign direct investment and portfolio investment. The categories covered in the first index are approval requirements, the extent to which profits can be remitted abroad, ease in liquidating assets, and whether or not direct investment benefits from preferential treatment.

[16]A complementary measure of financial globalization, in light of the growing internationalization of banking, would be the share of assets of the domestic financial system held by foreign banks. However, using the Bankscope database, I was unable to obtain sufficient observations to include it in the regressions. Yet another approach would be to use the indicator of intensity of capital controls developed by Edison and Warnock (2001); however, their calculations pertain mostly to middle-income countries.

indicator (being calculated in nominal terms), is sensitive to short-run fluctuations in world commodity prices, whereas the average effective tariff rate does not capture non-tariff barriers--information on which is highly unreliable. Similarly, the ratio of FDI to GDP may show large fluctuations in specific years, reflecting specific operations, such as the privatization of a large public enterprise. To mitigate or "smooth out" the impact of year-on-year fluctuations in terms-of-trade changes on external openness and year-on-year fluctuations in FDI flows, I use in the regressions below averages over two and three years, in addition to the one-year lagged value. I suspect that the "smoothing" effect associated with a three-year average may be excessive and impart some bias in assessing the relationship between globalization indicators and poverty; nonetheless, I will report them for comparative purposes.

In addition to the problem of finding adequate indicators of trade and financial openness, there is a major data constraint relative to poverty rates and some of the other control variables defined earlier. I first started by compiling all the data on developing countries available on the poverty headcount index contained in the World Bank Live Database (LDB), which cover the period from the late 1980s to the late 1990s. This gives a sample of 57 countries, and a total number of observations equal to, at most, 91.[17] However, due to the lack of available data on some of the control variables or globalization indicators (most notably government transfers as a share of GDP, average tariffs, and FDI), the "actual" sample size is at most 52 observations (for a total of 31 countries) in the initial set of regressions. After excluding the countries for which the number of observations is equal to one (Algeria, Brazil, Ecuador, Egypt, Ghana, Haiti, Kenya, Madagascar, Malawi, Malaysia, Mauritius, Nicaragua, Nigeria, Pakistan, Paraguay, Rwanda, Venezuela, Zimbabwe); I end up with a sample of 11 countries and at most 30 observations--6 countries for which the number of

[17]As is well known, there are serious conceptual and practical issues associated with the measurement of poverty, and the use of an "international poverty line" for cross-country comparisons (see, for instance, Deaton (2001)). I will return to these measurement issues in the concluding section.

observations is equal to two (Colombia, Dominican Republic, India, Jordan, Thailand, Tunisia); 3 for which the number of observations being equal to three (Morocco, Peru, Sri Lanka); one for which four observations are available (the Philippines); and one for which five observations available (Indonesia).

The estimation method is OLS with fixed effects. To account for simultaneity problems with the control variables, which from my previous studies appear to be particularly important, for growth and GDP per capita, I used lagged values of these two variables; and as noted above, for the globalization indicators I use averages over two and three years, in addition to the one-year lagged value.

IV. PRELIMINARY EVIDENCE

Table 1 summarizes some preliminary results, based on linear regressions, for the two measures of trade integration described earlier. Although inflation has the correct (positive) sign in all cases, it is not significant. Changes in the terms of trade also have no significant effect on poverty when the trade openness indicator is used, but it does appear to raise significantly the poverty rate when the average tariff rate is used as a measure of "real" globalization. An increase in the share of transfers to GDP is negatively associated with poverty, but the variable is significant again only when trade openness is measured by the average tariff rate. It is difficult to make much of the fact that public transfers and subsidies are not significant in the first set of regressions; the reason is that the variable does not measure very well what are the subsidies and transfers that actually go to the poor (it includes, for instance, transfers from the government to private and public enterprises). An increase in the rate of depreciation of the real exchange rate has a strong, negative effect on poverty (possibly because improvements in the relative price of tradables benefit to a significant extent farmers producing exportables in the agricultural sector), whereas an increase in its volatility tends to

increase significantly the proportion of the poor, as I found in an earlier study using a broader sample (see Agénor (2002*a*)). This latter effect may operate, as noted earlier, through and adverse effect of macroeconomic instability on the propensity to save and invest. The literacy rate has the correct sign and is highly significant in all the regressions shown in the table, whereas the health indicator (the number of hospital beds), despite being correctly signed in all cases, is statistically significant only when the average tariff rate is used. Both the level of real GDP per capita and its growth rate have the expected negative sign and are highly significant in all regressions involving the average tariff rate. By contrast, when trade integration is measured by the openness indicator, the level of real GDP per capita becomes statistically insignificant, despite the fact that its growth rate remains highly significant.

Regarding the measures of globalization, the ratio of FDI-to-GDP does not appear to be robustly correlated with the behavior of poverty across countries. Neither is the trade openness indicator, although it is significant at a 10 percent level when either a one-year lag or a three-year average is used. By contrast, the (lagged) average tariff rate has a statistically significant negative effect on poverty, implying that trade integration (as measured by a fall in average tariffs) increases poverty--perhaps through some of the various channels identified earlier. This finding is robust to the various ways of averaging the tariff rate.

What should one draw from these results? As other researchers in the field have done, my inclination is to consider the results using the average tariff rates as more reliable than those using the trade openness indicator. I also view the results obtained with either a one-year lag or a two-year average as preferable, because a three-year lag may impart (as noted earlier) excessive "smoothing" to the underlying series. Thus, one would be tempted to conclude from these results (and particularly regressions (4) and (5)) that financial openness has no effect on poverty, whereas trade integration appears to have an adverse effect. However, this conclusion would be premature; the regression results shown in Table 1

assume the existence of a linear relationship between globalization and the poor. But as discussed earlier, there are good reasons to believe that the relationship may be nonlinear.

V. A POVERTY-GLOBALIZATION LAFFER CURVE?

To capture the possibility of a nonlinear relationship between globalization and poverty, I proceed in two steps. First, instead of using several independent indicators as before, I derive a "composite" index of globalization (defined in such a way that an increase represents greater integration) by using principal components analysis. Second, I introduce the squared value of the index in the regressions. In order to generate a "poverty-globalization" Laffer curve (with an inverted U shape), the coefficient of the linear term should be positive, whereas the coefficient of the squared term should be negative. The peak of the quadratic equation would then identify the "threshold" level of globalization beyond which further integration reduces poverty.

1. Principal Components Analysis

One option to construct a composite indicator of globalization is to extend the methodology used for instance by Wacziarg (1998), and combine various indicators of trade openness (such as those used above) with measures of financial openness.[18] A problem with that approach, however, is the difficulty of defining relative weights in an objective manner. In this study, I tackle the problem differently. To derive a composite indicator of trade and financial globalization, I use principal components analysis (PCA). In essence, PCA aims to replace a

[18]Wacziarg (1998) developed an index of trade policy by combining several indicators, including average tariffs and an indicator of non-tariff barriers. The weights used to construct the

large set of variables by a smaller set that best "summarizes" the larger set. More formally, the principal components display the eigenvalue decomposition of the sample second moment of a group of series. The first principal component is computed as a linear combination of the series in the group with weights given by the first eigenvector, and so on. The higher the degree of co-movement existing among the original set of series, the fewer will be the number of principal components needed to explain a large portion of the variation of that set. Alternatively, if all *n* initial series are perfectly uncorrelated, it will take *n* principal components to explain all of the variance in the original series; no advantage would be gained by looking at common factors, because none exists in the first place.[19]

In this study, I use the first principal component as a globalization index. That is, using either two or three of the previously-defined indicators of trade and financial openness (FDI and one minus the tariff rate; and both variables plus the trade openness indicator), I use PCA to construct one series, the first principal component, that explains as much of the variance of the original series as possible.[20] To see whether selecting only the first principal component is sufficient, I used a simple variant of the *scree test*--essentially "eyeballing" a graph showing the proportion of the total variance (that is, the ratio of the first eigenvalue to the sum of all eigenvalues) that the component explains. Table 2 presents a summary of the results, for different lag-averaging procedures, and with and without the trade openness indicator. The results are based on standardized variables, to ensure that each series has a zero mean and a unit standard deviation (this standardization helps to ensure that all series receive uniform treatment and that the construction of the principal component measures is not

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combined index are determined from a regression of trade volumes (as a share of GDP) on these indicators plus some other determinants.

[19]Appendix B provides a brief technical discussion of PCA, as well as a description of my calculations (which are based on the correlation matrix of the original matrix, instead of the variance-covariance matrix).

[20]I use one minus the tariff rate, instead of the tariff rate itself, in order to ensure that an increase in any of the original series corresponds to greater integration. I also performed all the calculations reported below with one over the tariff rate and obtained very similar results.

influenced disproportionately by the series exhibiting the largest variation). They indicate, for instance, that excluding the trade openness indicator and for a two-lag average, the first principal component explains on average almost 72 percent of the variation in the original set of series. I therefore conclude that the first principal component does a good job at "summarizing" the information contained in the original series and can be used as a synthetic measure of globalization.

2. Estimation Results

The results of both linear and nonlinear regressions with the globalization index are displayed in Tables 3 and 4. In both tables, most of the previous conclusions regarding the control variables continue to hold. In particular, the literacy remains highly significant. However, the number of hospital beds loses some of its significance, despite retaining the correct sign in all cases. In addition, inflation becomes significant (when a two- or three-year averaging procedure is used) and so does the level of income per capita--regardless of whether the trade openness indicator is used or not in the original set of series used to perform PCA.[21] The degree of significance of the rate of real exchange rate depreciation varies significantly between Table 3 and 4: in the first case, it falls significantly when the trade openness indicator is included among the series used to calculate the first principal component and when a one-year lag is used, whereas in the second it becomes insignificant, when either a two- or three-year average is used and the trade openness indicator is excluded.

The results shown in Table 3 indicate that globalization tends to have an adverse effect on poverty, as shown indeed in Table 1 when the average tariff rate is used. However, this is not the whole story. As shown in Table 4, the squared value of the globalization index has a negative and highly significant

[21]In Table 4 the inflation tax rate and the share of transfers in GDP were excluded from some regressions, because they were incorrectly signed and (or) insignificant.

coefficient, regardless of whether one uses the trade openness indicator or not, and regardless of the number of lags used to average the original indicators of integration. This is true, in particular, of what I am tempted to regard the most "reliable" result--the regression in which the trade openness indicator is included and a two- or three-lag average is used. Indeed, these are the regressions for which the "best fit" (in the sense of the highest adjusted R-squared or the smallest standard error of the regression) is obtained in Table 4.

The implication of these results are clear: Given that the linear term has a positive coefficient, and the quadratic term a negative one, poverty at first increases when the index of globalization rises from low to moderate levels, and falls once globalization increases beyond a certain point. Put differently, although globalization at low levels may increase poverty, it may actually reduce it very significantly at higher levels.

1. Some Additional Sensitivity Tests

To assess the sensitivity of the previous results (in addition to the standard diagnostic tests reported in the tables), I performed two exercises. First, I used a ratio of 0.6 for the proportion of variance explained by the first principal component as a cut-off point for including a country in the regressions. The results obtained (available upon request) very virtually identical to those reported in Tables 3 and 4. But of course, given the smaller sample size, these results are less efficient.

It may also be argued that, in line with the previous analytical discussion, globalization may have an indirect effect on poverty by *a*) raising the growth rate of output and the level of income per capita; *b*) by strengthening macroeconomic discipline, thereby leading to lower inflation and variability in the real exchange rate. In an attempt to account for these indirect effects, I used a two-step procedure. I first "purged" inflation, the level of income per capita, the growth rate

of real GDP, and the index of real exchange rate volatility by regressing them on the globalization index (assuming fixed effects in each case). I then re-run the regressions shown in Table 4 using these "adjusted" variables. The results are shown in Table 5 and are broadly similar to those shown in Table 4, as far as the control variables are concerned.[22] They also indicate again that the "best" results are obtained when the globalization index is calculated with either a two- or three-year average of the original series and when the trade openness indicator is included.[23] Compared to Table 4, the level of significance of the linear term involving the globalization index drops when a two-lag average is used (it is now significant only at a 10 percent level); and the quadratic term remains highly significant. Overall, therefore, this attempt to correct for the indirect impact of globalization on output and macroeconomic discipline leads to results that are qualitatively similar to those obtained previously when the trade openness indicator is included in the calculation of the first principal component. An important difference, however, is the drop in the value of the coefficients of the linear term in the globalization index between Tables 4 and 5. For instance, for the two-year average lag, and with the trade openness indicator included, it falls from 0.027 to 0.015. At the same time, the coefficient on the quadratic term changes relatively little (from –0.021 to –0.028). This is important because the shape of the poverty-globalization Laffer curve is very different depending on the value of the coefficient of the linear term. To see this, let $\alpha > 0$ be the coefficient of the linear term, and $\beta < 0$ the coefficient of the squared term; the threshold value beyond which globalization starts reducing poverty is $-\alpha/2\beta$. With β being more or less the same under the one-step and two-step estimation results, the value of α plays a crucial role. Figure 1 illustrates the shape of the poverty-globalization Laffer curve for the two estimates of α obtained earlier (and for $\beta = -0.02$), under the assumption that the constant term in the functional forms is the same. Clearly, the

[22]Note again that in Table 5 the inflation tax rate and the literacy rate turned out to be incorrectly signed and (or) insignificant in some regressions, and were therefore excluded.

[23]As noted earlier, again, using three-year averages may imply "excessive" smoothing of the underlying series.

lower value of α under the two-step procedure implies (*ceteris paribus*) a significantly lower adverse effect of globalization on poverty.

VI. CONCLUDING REMARKS

Globalization, or the integration of economies and societies through trade, investment, finance, information and labor flows is, in the view of many, an inescapable feature of the world today. On the one hand, there is a considerable body of opinion arguing that globalization has led to substantial economic progress among rich and poor countries alike and, indeed, may be the principal mechanism for the international convergence of living standards. On the other, many point to the challenges that it poses for many countries as well as for the most vulnerable socio-economic groups within countries.

The purpose of this paper has been to examine the extent to which globalization affects the poor. Section II presented various arguments that may explain how trade and financial integration may hurt the poor. Two main points emerged from the discussion. The first is it is usually difficult to draw clear-cut theoretical conclusions regarding the effect of globalization on poverty as a result of conflicting effects, both in the short and the long run. Empirical studies are thus important to assess whether net effects are positive or negative. The second is that it is possible that nonlinearities may be involved in the relationship between globalization and poverty. Accounting for these effects is crucial for empirical testing.

The second part presented some preliminary evidence, based on linear cross-country regressions linking various measures of real and financial integration to poverty. The regressions (performed over a group of 11 low- and middle-income countries and with data covering the late 1980s and the 1990s)

control for changes in income per capita and output growth rates, as well as various other macroeconomic and structural variables, such as the inflation tax, changes in the real exchange rate and the terms of trade, health and schooling indicators, and macroeconomic volatility. The third part extended the analysis to derive a "globalization index" based on principal components analysis (using the set of trade and financial openness indicators defined in the preliminary regressions) and tested for both linear and nonlinear effects. The results indicate that there appears to be a reasonably robust, non-monotonic Laffer-type relationship between poverty and globalization (as measured by the first principal component): at low degrees of globalization, globalization does hurt the poor. However, at higher levels, globalization leads to a decline in poverty.

What is the source of this nonlinearity? At this stage, and without further empirical work, I can offer only conjectures, based on my analytical review of the links between globalization and poverty. One possible explanation is that beyond a certain threshold a greater degree of real and financial integration brings with it (or induces governments to implement) far-reaching domestic institutional reforms that improve the ability of private agents to save and invest, strengthen the financial system and the regulation and supervision of financial intermediaries, and more generally improve the "social and legal infrastructure" that is conducive to greater risk taking. Regardless of the exact mechanism that may be at play, however, the striking implication of the poverty-globalization Laffer curve is that, paradoxically, globalization may hurt the poor in some countries not because it went too far but rather because it did not go far enough. Put differently, by focusing on different portions of the curve, both advocates and opponents of globalization have been missing part of the story.

I will conclude with the usual note of caution--the empirical results reported in this paper require further testing to assess their robustness. The existence of nonlinearities could be further explored by using splines and exploring their sensitivity to the choice of breakpoints. Alternatively, one could exploit techniques such as projection pursuit (as in Friedman and Stuetzle (1981)) or the method of

alternating conditional expectations (Breiman and Friedman (1985)). More importantly perhaps, the sample size used in this study is small, mostly due to the lack of available data on poverty rates. The lack of a sufficient number of observations prevents the use of more advanced regression techniques, such as the GMM method used by Hansen and Tarp (2001) in a different context, which would allow to control at the same time for both unobserved country-specific characteristics and endogeneity. Moreover, the available data on both sides of the regression equation are not highly reliable. As is well known, the aggregate measure of poverty used in this study is based on survey data; but there are large differences across countries in measuring poverty from these micro data (related most notably to differences in definitions of income or consumption), which create potentially serious comparability problems. I have used "effective" measures of trade and financial integration, but the data are not without problems. Using average import tariffs does not account for the existence of non-tariff barriers (which themselves are very difficult to measure with any degree of precision). An alternative option to measure trade openness might be to use the new index of trade restrictiveness compiled by the IMF, which is based on a variety of published and unpublished sources (see Lankes (2002)); and as noted earlier, the share of assets of the domestic financial system held by foreign banks could be a complementary measure of financial globalization. In both cases, however, the number of observations available remains an issue.

I also found that fixed effects (which were not reported here to save space) are important and statistically significant in many cases, suggesting that country-specific factors are important in determining the behavior of poverty rates. There is therefore a risk of misspecification that may persist despite my effort to control adequately for various determinants of poverty. More generally, parameter heterogeneity is a key problem in the type of cross-country, growth-poverty regressions presented in this study. Indeed, an implicit assumption in this type of regressions is that the parameters are constant across countries, that is, that all countries follow the same underlying model relating growth and poverty. If one is

interested only in estimating parameter averages, this can be weakened slightly, by assuming only that parameters are distributed independently of the variables in the regression. Yet even this weaker assumption is likely to be too strong. One can easily suggest examples of parameters that are likely to be correlated with variables in the regression--for instance, macroeconomic instability may be associated with both lower growth and a lower impact of growth on poverty, so that the coefficient on macroeconomic instability should ideally be allowed to vary across countries. A sensible response to this is to find ways of modeling heterogeneity. For instance, in the above example, it might be possible to reduce the extent of heterogeneity by introducing an interaction term between macroeconomic instability and growth, and by using heteroskedasticty-consistent standard errors for inference. Regardless, however, the regression model remains likely to embody restrictions on the parameters, which make using the model at the individual country level problematic at best. An alternative approach would be to perform explicit tests explicitly for pooling and parameter heterogeneity. Unfortunately, the lack of observations remains a serious constraint.[24]

[24]To detect parameter heterogeneity (or the "poolability" of the data) one could use a two-step Chow test (as, for instance, in Evans, Green, and Murinde (2002)), or the Dutta-Leon test (see Dutta and Leon (1991)). Other methods, based on Bayesian analysis, are described by Maddala and Wu (1996, 2000). However, none of these tests can be implemented here because they all require sufficiently long time series for each individual country.

Appendix A

Country Names, Variable Definitions, and Data Sources

This Appendix presents the list of countries included in the regression results presented in the Tables, a more precise definition of the variables used in the regressions, and sources of the data.

Countries

Regressions with the complete sample are based on the following list of countries (years of observation on poverty rates in parentheses): Colombia (1991, 1992), Dominican Republic (1989, 1992), India (1992, 1994), Indonesia (1987, 1990, 1996, 1998-99), Jordan (1991, 1997), Morocco (1985, 1991, 1999), Peru (1986, 1994, 1997), Philippines (1985, 1991, 1994, 1997), Sri Lanka (1986, 1991, 1996), Thailand (1990, 1992), and Tunisia (1985, 1990). As noted in the text, these countries are all of those for which at least two data points on poverty (as measured by the headcount index) were available in the World Bank LDB database, taking into account as well the availability of data on some of the control variables and the globalization indicators.

Definition and source of variables used in regressions

POV: Poverty index. Source: World Bank LDB Database.

INFLTAX: Inflation tax rate in terms of consumer prices. It is defined as the ratio of the inflation rate over one plus inflation rate. Source: 2001 World Development Indicators CD-ROM (WDI).

TRANSGDP: Subsidies and other current government transfers as a share of GDP. Source: WDI.

LITY: Youth total literacy rate as a share of people ages 15-24. Source: WDI.

LHOSPITAL: Log of hospital beds per 1,000 people. Source: WDI.

LGDPPC: Log of GDP per capita measured at purchasing power parity exchange rates. Source: WDI.

REALGR: Growth rate of per capita real GDP, measured at purchasing power parity exchange rates. Source: WDI.

REALEX: Percentage change in the real effective exchange rate. A rise is a depreciation. Source: International Financial Statistics, IMF.

FDI: Foreign direct investment as a share of GDP (net inflows). The averages are defined over 1, 2, and 3 lagged years. Source: WDI.

OPEN: Ratio of the sum of imports and exports of goods and services in percent of GDP. The averages are defined over 1, 2, and 3 lagged years. Source: WDI.

TARIFF: Ratio of import duties over imports. The averages are defined over 1, 2, and 3 lagged years. Source: WDI.

CTOT: Percentage change in the terms of trade index. Source: WDI.

VREALXL: Measure of macroeconomic volatility. It is given by the ratio of the standard deviation of real effective exchange rate at t, t-1,t-2, t-3 to the average of it for the same period (coefficient of variation).

Appendix B

Calculation of Principal Components

This Appendix describes briefly the methodology of principal components analysis (PCA) and explains how PCA was applied in this study.[25]

PCA is based on a key result from matrix algebra, according to which a *pxp* symmetric, nonsingular matrix, such as the correlation matrix **R**, may be reduced to a diagonal matrix Λ by pre- and post-multiplying it by a particular orthonormal matrix **U**, which is such that

$$\mathbf{U'RU} = \Lambda.$$

The diagonal elements of Λ, $\lambda_1, \lambda_2, \ldots, \lambda_p$, are the characteristic roots (or eigenvalues) of **R**, which are obtained from the solution of the characteristic equation:

$$|\mathbf{R} - \lambda\mathbf{I}| = 0,$$

where **I** is the identity matrix. This equation produces a *p*th degree polynomial in λ, from which the values $\lambda_1, \lambda_2, \ldots, \lambda_p$ are obtained.

When using correlation matrices in PCA, the first step is to put all of the data in standard units; that is, perform the operation $(x-\bar{x})/s$ for each variable, where x is the mean of original variable and s is the standard deviation. These standardized data are then treated as observations. By doing this, all of the transformed variables have unit variances and the resulting covariance matrix is actually the correlation matrix of the original variables.

The principal axis transformation transforms p correlated variables $x_1, x_2, \ldots, x_p$ into p new uncorrelated variables $z_1, z_2, \ldots, z_p$. The coordinate axes of these new variables are described by the characteristic vectors $\mathbf{u}_i$, which make up the matrix **U** of direction cosines used in the transformation:

$$z = \mathbf{U'}[x-\bar{x}].$$

Here x and $\bar{x}$ are $px1$ vectors of observations on the original variables and their means.

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[25]The following brief presentation of PCA is based on Morrison (1990) and Jackson (1991), and uses the correlation matrix, instead of the variance-covariance matrix. The reason is that, in general, even if the original variables used in PCA are in the same units, their variances may differ widely, often because they are related to their means. This may give undue weight to certain variables.

The transformed variables are called the principal components of x. The ith principal component is

$$z_i = \mathbf{u}_i'[x - \bar{x}],$$

and has mean zero and variance λ_i, the ith characteristic root.

Let

$$\mathbf{D} = \begin{bmatrix} s_1 & 0 & \cdots & 0 \\ 0 & s_2 & \cdots & 0 \\ \vdots & \vdots & \cdots & \vdots \\ 0 & 0 & \cdots & s_p \end{bmatrix}$$

that is, **D** is a diagonal matrix of standard deviations of the original variables. The correlation matrix **R** can therefore be written as

$$\mathbf{R} = \mathbf{D}^{-1}\mathbf{S}\mathbf{D}^{-1}.$$

Let

$$\mathbf{V} = \mathbf{U}\Lambda^{1/2}.$$

This matrix gives the correlation between the principal components and the original variables. It can be used to determine the correlation of each principal component with each of the original variables. Specifically, the correlation of the ith principal component, z_i, and the jth original variable, x_j, is equal to

$$r_{z_i x_j} = u_{ji}\sqrt{\lambda_i}\,.$$

In this study, the first principal components are calculated country by country, before running the poverty regressions. The following periods are used for each of the 11 countries referred to in the text and in Appendix A: Colombia (1980-99), Dominican Republic (1980-99), India (1980-99), Indonesia (1982-99), Jordan (1980-99), Morocco (1980-99), Peru (1980-99), the Philippines (1980-99), Sri Lanka (1980-99), Thailand (1980-99), and Tunisia (1980-99). Applying the formula above indicates that the correlation of the first principal component with all of the original variables is in general fairly high.

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Table 1
Poverty and Globalization: Basic Regression Results
(OLS with fixed effects)

	Dependent variable: Headcount poverty index					
	Trade Openness Indicator			Average Tariff Rate		
	(1)	(2)	(3)	(4)	(5)	(6)
INFLTAX	0.139	0.083	0.010	—	0.004	0.025
	(0.929)	(0.601)	(0.071)		(0.054)	(0.260)
TRANSGDP (-1)	-0.475	-0.652	-0.996	-2.521	-2.354	-1.904
	(-0.451)	(-0.614)	(-0.940)	(-3.363)	(-4.014)	(-3.665)
LITY	-1.824	-1.768	-1.944	-1.580	-1.762	-1.754
	(-4.547)	(-3.929)	(-3.857)	(-4.878)	(-7.054)	(-6.631)
LHOSPITAL	-0.148	-0.122	-0.133	-0.125	-0.135	-0.111
	(-1.434)	(-1.184)	(-1.261)	(-2.064)	(-2.783)	(-2.461)
GDPPC (-1)	0.007	0.002	0.027	-0.061	-0.059	-0.051
	(0.131)	(0.044)	(0.409)	(-2.448)	(-1.714)	(-1.417)
REALGR (-1)	-0.577	-0.521	-0.500	-0.264	-0.448	-0.478
	(-4.187)	(-3.768)	(-3.682)	(-2.626)	(-6.745)	(-7.365)
REALEX	-0.097	-0.074	-0.062	-0.081	-0.035	-0.024
	(-3.673)	(-2.969)	(-2.205)	(-3.391)	(-2.352)	(-1.523)
CTOT	0.152	0.170	0.173	0.377	0.253	0.205
	(0.762)	(0.852)	(0.857)	(3.459)	(2.079)	(1.696)
VREALXL	0.359	0.354	0.400	0.644	0.475	0.380
	(1.726)	(1.680)	(1.907)	(6.061)	(5.665)	(4.228)
AV_FDI1	0.103	—	—	0.830	—	—
	(0.173)			(1.539)		
AV_FDI2	—	0.306	—	—	0.324	—
		(0.378)			(0.475)	
AV_FDI3	—	—	0.195	—	—	0.112
			(0.271)			(0.188)
AV_OPEN1	-0.193	—	—	—	—	—
	(-1.578)					
AV_OPEN2	—	-0.199	—	—	—	—
		(-1.396)				
AV_OPEN3	—	—	-0.261	—	—	—
			(-1.544)			
AV_TARIFF1	—	—	—	-0.387	—	—
				(-3.809)		
AV_TARIFF2	—	—	—	—	-0.655	—
					(-4.631)	
AV_TARIFF3	—	—	—	—	—	-0.853
						(-4.475)
Adj. R2	0.909	0.905	0.909	0.931	0.921	0.925
Number of obs.	29	29	29	30	29	29
Standard Error of Regression	0.042	0.043	0.042	0.038	0.039	0.038

Note: INFLTAX is the inflation tax rate. It is defined as the ratio of the inflation rate to one plus inflation rate. The inflation rate is the annual change in the consumer price index. TRANSGDP is transfers as a share of GDP. LITY is the literacy rate for the youth as a share of total population. LHOSPITAL is the log of the number of beds per 1000 people. GDPPC(-1) is the lagged value of the log of the GDP per capita (purchasing power parity). REALGR(-1) is the lagged value of the annual growth rate of GDP per capita (purchasing power parity). REALEX is the annual change in the real effective exchange rate index (a rise is depreciation). CTOT is the percentage change in the terms of trade. VREALXL is the volatility measure of the real effective exchange rate. It is calculated as the ratio of the standard deviation of a variable for *t*, *t*-1, *t*-2 and *t*-3 to the average value for the same period. AV_FDI is the average value of foreign direct investment as a share of GDP. AV_OPEN is the average value of openness, which is the ratio of the sum of imports and exports of goods and services to GDP (all in nominal terms). AV_TARIFF is the average value of the tariff rate, which is the ratio of import duties to imports. 1, 2, and 3 stands for the mean of a variable at *t*-1, at *t*-1 and *t*-2, and at *t*-1, *t*-2, and *t*-3, respectively.

Table 2
Proportion of Total Variance Explained by the First Principal Component

Country	Excluding trade openness indicator			Including trade openness indicator		
	First lag	2-lag average	3-lag average	First lag	2-lag average	3-lag average
Colombia	0.692	0.711	0.723	0.564	0.583	0.598
Dominican Republic	0.605	0.611	0.622	0.539	0.574	0.600
India	0.843	0.856	0.870	0.850	0.860	0.872
Indonesia	0.566	0.679	0.704	0.577	0.664	0.728
Jordan	0.687	0.700	0.682	0.502	0.505	0.498
Morocco	0.600	0.612	0.647	0.454	0.421	0.446
Peru	0.757	0.805	0.831	0.528	0.610	0.651
Philippines	0.658	0.569	0.513	0.697	0.665	0.640
Sri Lanka	0.774	0.832	0.879	0.764	0.821	0.880
Thailand	0.837	0.819	0.804	0.839	0.837	0.835
Tunisia	0.638	0.613	0.603	0.633	0.638	0.659
AVERAGE (all countries)	0.696	0.710	0.716	0.632	0.653	0.673
AVERAGE (excluding countries for which the principal component is less than 0.6)	0.696	0.736	0.735	0.736	0.718	0.726

Note: The principal component is always constructed with the foreign direct investment ratio and one minus the tariff rate. It is calculated with either the trade openness indicator included or excluded. For each country, the periods are reported in the appendix.

Table 3
Poverty and Globalization Index: Linear Regression Results
(OLS with fixed effects)

	Dependent variable: Headcount poverty index					
	Excluding trade openness indicator			Including trade openness indicator		
	First lag	2-lag average	3-lag average	First lag	2-lag average	3-lag average
INFLTAX	0.020	0.105	0.179	0.029	0.083	0.173
	(0.295)	(1.718)	(2.223)	(0.330)	(1.245)	(2.126)
TRANSGDP (-1)	-1.932	-1.708	-0.949	-1.089	-1.084	-0.690
	(-2.947)	(-3.465)	(-1.746)	(-1.181)	(-1.680)	(-1.131)
LITY	-0.959	-0.751	-0.693	-1.675	-1.495	-1.194
	(-3.913)	(-2.308)	(-1.516)	(-5.912)	(-5.480)	(-3.320)
LHOSPITAL	-0.045	-0.056	-0.056	-0.048	-0.037	-0.022
	(-0.709)	(-1.202)	(-1.298)	(-0.675)	(-0.673)	(-0.435)
GDPPC (-1)	-0.136	-0.159	-0.166	-0.067	-0.107	-0.138
	(-3.495)	(-5.089)	(-3.820)	(-1.368)	(-2.211)	(-2.824)
REALGR (-1)	-0.317	-0.286	-0.337	-0.344	-0.314	-0.326
	(-3.476)	(-2.942)	(-3.152)	(-2.808)	(-2.657)	(-2.871)
REALEX	-0.078	-0.067	-0.053	-0.036	-0.041	-0.041
	(-3.809)	(-4.377)	(-3.139)	(-1.133)	(-2.035)	(-2.395)
CTOT	0.246	0.183	0.177	0.278	0.224	0.195
	(2.176)	(1.495)	(1.350)	(2.047)	(1.793)	(1.514)
VREALXL	0.520	0.348	0.212	0.364	0.301	0.205
	(5.049)	(4.855)	(1.888)	(2.812)	(2.951)	(1.716)
GLOBINDEX1	0.025	—	—	0.0106	—	—
	(4.075)			(0.955)		
GLOBINDEX2	—	0.028	—	—	0.016	—
		(3.878)			(1.702)	
GLOBINDEX3	—	—	0.025	—	—	0.018
			(2.704)			(2.118)
Adj. R2	0.920	0.926	0.926	0.902	0.909	0.913
Number of obs.	29	29	29	29	29	29
Standard Error of Regression	0.039	0.038	0.038	0.044	0.042	0.041

Note: See the note of Table 1 for the definition of the variables. GLOBINDEX1 is the globalization index calculated as the first principal component of AV_TARRIFF1 and AV_FDI1. AV_OPEN1 is either included or excluded. Similarly, GLOBINDEX2 and GLOBINDEX3 are calculated as the first principal components of AV_TARIFF2, AV_FDI2, and AV_OPEN2, and AV_TARIFF3, AV_FDI3, and AV_OPEN3, successively.

Table 4
Poverty and Globalization Index: Nonlinear Regression Results
(OLS with fixed effects)

	Dependent variable: Headcount poverty index					
	Excluding trade openness indicator			Including trade openness indicator		
	First lag	2-lag average	3-lag average	First lag	2-lag average	3-lag average
INFLTAX	—	0.133	0.273	—	0.081	0.157
		(2.206)	(3.177)		(1.204)	(1.886)
TRANSGDP (-1)	-2.213	-0.746	—	-1.661	-1.134	-0.101
	(-3.228)	(-2.001)		(-2.377)	(-1.915)	(-0.254)
LITY	-0.976	-1.148	0.389	-1.762	-2.255	-1.917
	(-3.320)	(-4.159)	(1.247)	(-4.770)	(-5.841)	(-5.898)
GDPPC (-1)	-0.119	-0.119	-0.224	-0.089	-0.122	-0.097
	(-3.587)	(-3.802)	(-4.554)	(-1.785)	(-3.690)	(-2.186)
REALGR (-1)	-0.097	-0.550	-0.471	-0.179	-0.881	-1.050
	(-0.809)	(-5.069)	(-3.625)	(-1.652)	(-3.911)	(-4.286)
REALEX	-0.079	0.011	-0.014	-0.051	-0.074	-0.073
	(-2.594)	(0.367)	(-0.741)	(-1.258)	(-3.707)	(-4.826)
CTOT	0.281	0.076	0.017	0.285	-0.079	-0.037
	(2.826)	(0.597)	(0.142)	(2.617)	(-0.581)	(-0.321)
VREALXL	0.614	0.234	0.087	0.477	0.447	0.340
	(6.192)	(3.186)	(0.791)	(4.175)	(4.231)	(3.514)
GLOBINDEX1	0.030	—	—	0.022	—	—
	(4.448)			(2.190)		
GLOBINDEX1^2	-0.008	—	—	-0.002	—	—
	(-1.395)			(-0.972)		
GLOBINDEX2	—	0.026	—	—	0.027	—
		(3.912)			(3.921)	
GLOBINDEX2^2	—	-0.015	—	—	-0.021	—
		(-2.533)			(-2.915)	
GLOBINDEX3	—	—	0.035	—	—	0.025
			(3.679)			(3.839)
GLOBINDEX3^2	—	—	-0.012	—	—	-0.021
			(-2.390)			(-3.033)
Adj. R2	0.940	0.939	0.931	0.927	0.954	0.958
Number of obs.	30	29	30	30	29	29
Standard Error of Regression	0.035	0.034	0.036	0.039	0.030	0.028

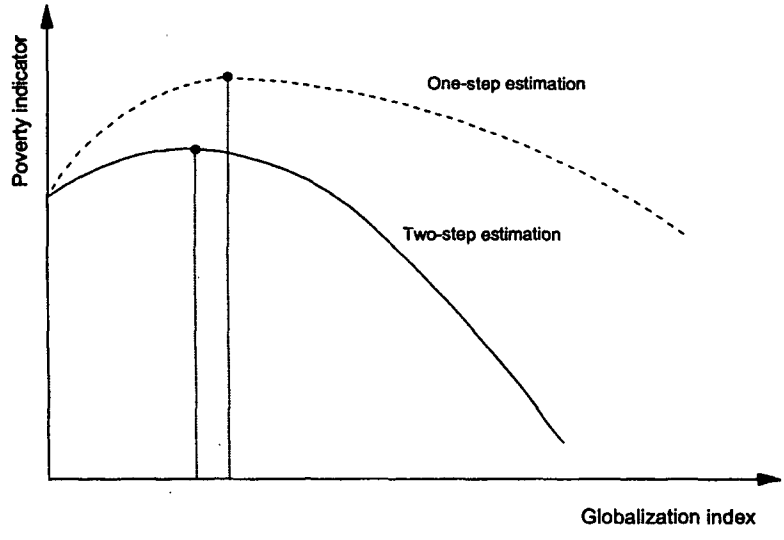
Note: See the note of Table 1 and Table 4 for the definition of the variables. GLOBINDEX1^2, GLOBINDEX2^2, and GLOBINDEX3^2 is the square term of GLOBINDEX1, GLOBINDEX2, and GLOBINDEX3, successively.

Table 5
Poverty and Globalization Index: Nonlinear Regression Results
(OLS with fixed effects, Two-step Procedure)

	Dependent variable: Headcount poverty index					
	Excluding trade openness indicator			Including trade openness indicator		
	First lag	2-lag average	3-lag average	First lag	2-lag average	3-lag average
RINFLTAX	0.041	0.148	0.153	—	0.224	0.149
	(0.558)	(1.697)	(2.043)		(2.392)	(1.562)
TRANSGDP (-1)	-3.078	-1.805	-1.100	-2.965	-0.289	-0.140
	(-2.922)	(-1.428)	(-0.990)	(-3.096)	(-0.333)	(-0.172)
LITY	—	—	—	—	-1.212	-0.949
					(-0.945)	(-0.784)
RGDPPC (-1)	-0.202	-0.183	-0.149	-0.151	-0.182	-0.109
	(-4.843)	(-3.950)	(-4.393)	(-5.120)	(-2.924)	(-2.171)
RREALGR (-1)	-0.265	-0.367	-0.502	-0.253	-1.136	-1.061
	(-3.009)	(-2.617)	(-3.347)	(-2.578)	(-4.133)	(-3.500)
REALEX	-0.074	-0.050	-0.030	-0.098	-0.083	-0.079
	(-2.985)	(-1.106)	(-1.290)	(-2.643)	(-3.367)	(-3.818)
CTOT	0.404	0.349	0.327	0.488	-0.222	-0.068
	(2.497)	(1.617)	(1.718)	(3.446)	(-1.366)	(-0.347)
RVREALXL	0.578	0.373	0.325	0.703	0.354	0.387
	(3.772)	(1.965)	(2.054)	(4.311)	(3.079)	(2.757)
GLOBINDEX1	0.013	—	—	0.004	—	—
	(2.132)			(0.710)		
GLOBINDEX1^2	-0.004	—	—	-0.003	—	—
	(-1.064)			(-1.285)		
GLOBINDEX2	—	0.005	—	—	0.015	—
		(0.891)			(1.569)	
GLOBINDEX2^2	—	-0.005	—	—	-0.028	—
		(-0.819)			(-4.005)	
GLOBINDEX3	—	—	0.006	—	—	0.015
			(0.969)			(1.369)
GLOBINDEX3^2	—	—	-0.008	—	—	-0.023
			(-1.481)			(-2.808)
Adj. R2	0.936	0.932	0.924	0.939	0.949	0.937
Number of obs.	26	26	26	27	26	26
Standard Error of Regression	0.035	0.036	0.038	0.036	0.031	0.035

Note: See the note of Tables 1 and 3 for the definition of the variables. RINFL is the residual measure obtained by regressing INFL on fixed effects and GLOBINDEX1, GLOBINDEX2, or GLOBINDEX3. RGDPPC is the residual measure obtained by regressing GDPPC on fixed effects and GLOBINDEX1, GLOBINDEX2, or GLOBINDEX3. RREALGR is the residual measure obtained by regressing REALGR on fixed effects and GLOBINDEX1, GLOBINDEX2, or GLOBINDEX3. RVREALXL is the residual measure obtained by regressing VREALXL on fixed effects and GLOBINDEX1, GLOBINDEX2, or GLOBINDEX3.

Figure 1
The Poverty-Globalization Laffer Curve



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